

WHAT IS CLAIMED IS:

1. A microwave phase shifter comprising:

a circuit board on which a transmission line to
transmit a microwave signal is formed on one surface of
5 a semi-insulating layer, a first conductive layer is
formed on the other surface, a second conductive layer
is formed on a forming surface of the transmission line
with an end portion set in close proximity to one side
of the transmission line, and an active layer is formed
10 under a forming portion of the transmission line in the
semi-insulating layer; and

bias circuit which applies bias voltage to the
transmission line.

2. The microwave phase shifter according to

15 claim 1, wherein the bias circuit grounds the first and
second conductive layers and applies a bias voltage of
negative polarity to the transmission line.

3. The microwave phase shifter according to

claim 1, wherein the bias circuit variably controls the
20 bias voltage in a continuous or stepwise fashion.

4. A microwave phase shifter comprising:

a circuit board on which a transmission line to
transmit a microwave signal is formed on one surface of
a liquid crystal dielectric layer, a first conductive
25 layer is formed on the other surface, and a second
conductive layer is formed on a forming surface of the
transmission line with an end portion set in close

proximity to one side of the transmission line; and
bias circuit which applies bias voltage to the
transmission line.

5 5. The microwave phase shifter according to
claim 4, wherein the bias circuit grounds the first and
second conductive layers and applies a bias voltage
whose polarity is periodically inverted to the
transmission line.

10 6. The microwave phase shifter according to
claim 4, wherein the bias circuit variably controls the
bias voltage in a continuous or stepwise fashion.

15 7. A power amplifier comprising:
distributor which distributes a microwave signal
to a plurality of transmission paths;
a plurality of amplifiers respectively provided in
the plurality of transmission paths to power-amplify
the transmission signals;

20 phase adjusting circuit which adjusts signal
propagation phases between the plurality of
transmission paths by using any one of the plurality of
transmission paths as a reference path, providing phase
shifters in at least the other paths and adjusting
phase shift amounts of the phase shifters; and

25 synthesizer which synthesizes the signals power-
amplified by the plurality of amplifiers at ends of the
plurality of transmission paths;

wherein the phase shifter includes a circuit board

on which a transmission line to transmit a microwave signal is formed on one surface of a semi-insulating layer, a first conductive layer is formed on another surface, a second conductive layer is formed on a forming surface of the transmission line with an end portion set in close proximity to one side of the transmission line, and an active layer is formed under a forming portion of the transmission line in the semi-insulating layer, and bias circuit applies bias voltage to the transmission line, and

the phase adjusting circuit supplies a bias voltage corresponding to the phase shift amount to the phase shifter.

8. The power amplifier according to claim 7,
15 wherein the bias circuit grounds the first and second conductive layers and applies a bias voltage of negative polarity to the transmission line.

9. The power amplifier according to claim 7,
wherein the bias voltage is variably controlled in
20 a continuous or stepwise fashion.

10. The power amplifier according to claim 7,
wherein the phase shifter is arranged on the output side of the power amplifier.

11. The power amplifier according to claim 7,
25 wherein the phase adjusting circuit includes a monitor which monitors an output signal of the synthesizer and a control device which controls a voltage value of

the bias voltage based on the monitoring result of the monitor.

12. A power amplifier comprising:

- distributor which distributes a microwave signal
5 to a plurality of transmission paths;
- a plurality of amplifiers respectively provided in the plurality of transmission paths to power-amplify the transmission signals;
- phase adjusting circuit which adjusts signal
10 propagation phases between the plurality of transmission paths by using any one of the plurality of transmission paths as a reference path, providing phase shifters in at least the other paths and adjusting phase shift amounts of the phase shifters; and
15 synthesizer which synthesizes the signals power-amplified by the plurality of amplifiers at ends of the plurality of transmission paths;
- wherein the phase shifter includes a circuit board
20 on which a transmission line to transmit a microwave signal is formed on one surface of a liquid crystal dielectric layer, a first conductive layer is formed on the other surface, and a second conductive layer is formed on a forming surface of the transmission line with an end portion set in close proximity to one side
25 of the transmission line, and bias circuit for applying bias voltage to the transmission line, and
the phase adjusting circuit supplies a bias

voltage corresponding to the phase shift amount to the phase shifter.

13. The power amplifier according to claim 12,
wherein the bias circuit grounds the first and second
5 conductive layers and applies bias voltage whose
polarity is periodically inverted to the transmission
line.

14. The power amplifier according to claim 12,
wherein the bias circuit variably controls the bias
10 voltage in a continuous or stepwise fashion.

15. The power amplifier according to claim 12,
wherein the phase shifter is arranged on the output
side of the power amplifier.

16. The power amplifier according to claim 12,
wherein the phase adjusting circuit includes a monitor
15 which monitors an output signal of the synthesizer and
a control device which controls a voltage value of the
bias voltage based on the monitoring result of the
monitor.

20 17. A circuit board of a microwave phase shifter
comprising:

a semi-insulating layer;
a transmission line formed on one surface of the
semi-insulating layer to transmit a microwave signal;
25 a first conductive layer formed on the other
surface of the semi-insulating layer;
a second conductive layer formed on a transmission

line forming surface of the semi-insulating layer with an end portion set in close proximity to one side of the transmission line;

5 an active layer formed under a transmission line forming portion in the semi-insulating layer;

 a ground terminal to which the first and second conductive layers are connected; and

 a bias voltage input terminal to which the transmission line is connected.

10 18. A circuit board of a microwave phase shifter comprising:

 a liquid crystal dielectric layer;

 a transmission line formed on one surface of the liquid crystal dielectric layer to transmit a microwave signal;

 a first conductive layer formed on the other surface of the liquid crystal dielectric layer;

15 a second conductive layer formed on a transmission line forming surface of the liquid crystal dielectric layer with an end portion set in close proximity to one side of the transmission line;

 a ground terminal to which the first and second conductive layers are connected; and

20 a bias voltage input terminal to which the transmission line is connected.